MILITARY OPERATIONS RESEARCH SOCIETY

MORS

MORS Workshop
Training Transformation: Analysis and Assessment in New Operational Environments

28-30 September 2004
Science Applications International Corporation (SAIC)
McLean, Virginia

Chairs:
Fred Hartman, FS and Annie Patenaude

20080122011

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DISCLAIMER

This Military Operations Research Society report summarizes the proceedings of a workshop conducted over three days by experts, users and participants interested in quantifying the relationship between testing and simulation. It is not intended to be a comprehensive treatise on the subject. It reflects the major concerns, insights, thoughts and directions of the participants at the time of the workshop.

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REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE (DD-MM-YYYY)	2. REPORT TYPE	3. DATES COVERED (From – To)
25 August 2006	Workshop Report	28-30 September 2004

4. TITLE AND SUBTITLE

MORS Workshop Report
Training Transformation: Analysis and Assessment in New Operational Environments

5a. CONTRACT NUMBER

N00014-04-C-0092

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Chairs: Fred Hartman, FS and Annie Patenaude
Corrina Ross-Witkowski, Editor/Publisher

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Military Operations Research Society, 1703 N. Beauregard St, Suite 450, Alexandria, VA 22311-1745

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

Distribution Statement A:
Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

This publication is the report of the *Training Transformation: Analysis and Assessment in New Operational Environments* Workshop.

15. SUBJECT TERMS

16. SECURITY CLASSIFCATION: UNCLASSIFIED			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON Corrina Ross-Witkowski
a. REPORT	b. ABSTRACT	c. THIS PAGE	Unlimited	1-22 Appendix A-1 thru B-6	19b. TELEPHONE NUMBER (include area code)
Unclassified	Unclassified	Unclassified			703-933-9070 FAX: 703-933-9066

Standard Form 298 (Rev. 8-98)

CLASSIFIED BY:

DECLASSIFIED ON:

MILITARY OPERATIONS RESEARCH SOCIETY

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The Military Operations Research Society (MORS)

The purpose of the Military Operations Research Society (MORS) is to enhance the quality and effectiveness of classified and unclassified military operations research. To accomplish this purpose, the Society provides media for professional exchange and peer criticism among students, theoreticians, practitioners and users of military operations research. These media consist primarily of the traditional annual MORS Symposia (classified), their published abstracts or proceedings, special mini-symposia, workshops, colloquia and special purpose monographs and other publications. MORS publishes two quarterly periodicals, *PHALANX* and *Military Operations Research*. *PHALANX* is the MORS bulletin and *Military Operations Research* is a refereed journal. The forum provided by these media is intended to display the state of the art, to encourage consistent professional quality, to stimulate communication and interaction between practitioners and users, and to foster the interest and development of students of operations research. The Military Operations Research Society neither makes nor advocates official policy, nor does it attempt to influence the formulation of policy. Matters discussed or statements made during the course of its meetings or printed in its publications represent the positions of the individual participants and authors and not of the Society.

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- The Commanding General, Marine Corps Combat Development Command
- The Director of Force Structure, Resources and Assessment, The Joint Staff
- The Director Program Analysis and Evaluation, Office Secretary of Defense

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INTRODUCTION

From 28 through 30 September, 2004, the Military Operations Research Society conducted a workshop at Science Applications International Corporation in McLean, VA, in support of the Joint Assessment and Enabling Capability (JAEC) with the goal of developing an approach for managing and implementing the organizational concepts, analytical measures and methods, scientific and technological innovations, and assessment capabilities for the assessment of Training Transformation (T2).

BACKGROUND

In today's information age and new globalization environment, success is defined more by force adaptability and agility rather than solely by industrial age scale and scope. Secretary Rumsfeld emphasizes this point in a recent Wall Street Journal article by stating, "We are fighting the first wars of the 21st century with a DoD that was designed for the challenges of the mid- to late-20th century." Force Transformation, therefore, is about becoming more adaptable and agile thru application of rapidly evolving capabilities and technologies, and the T2 initiative is a key enabler for the overall success of DoD Transformation.

On June 10, 2003, The Deputy Secretary of Defense approved the DoD Training Transformation Implementation Plan in order to enable T2. This plan designates three program capabilities to carry out the T2 Initiative:

1) **Joint National Training Capability (JNTC).** The JNTC mission is to prepare units and staffs collectively to improvise, adapt, and achieve unity of effort — with appropriate joint context — allowing global training and mission rehearsal to support operational needs.
2) **Joint Knowledge Development and Distribution Capability (JKDDC).** The JKDDC will prepare individuals to think intuitively "joint" by creating, storing, distributing, and applying knowledge through a dynamic global network.
3) **Joint Assessment and Enabling Capability (JAEC).** The JAEC will assess, analyze, and enable training transformation initiatives for people, organizations and processes and enable transformation.

Within this new training system, JNTC (unit and staff training) and JKDDC (individual training) are the major capability production and distribution engines supporting COCOM needs. Naturally, these two capabilities operate within an extended DoD policy and program environment; an environment that can effect desired outcomes.

To facilitate desired training system throughput and capability delivery, leading ultimately to training system transparency to force operations, JAEC is charged with measuring T2 progress through assessment, analysis, and enabling effectiveness and efficiency. To properly conduct assessments, we must be able to determine measures of effectiveness, measures of performance, and measures of merit. In order to enable effectiveness, we must thoroughly understand and enable training objectives, training

audiences, and training tools. JAEC assessment will include analysis for planning operations and planning exercises with robust after action review processes and a broad set of tools. In order to enable training planning, we must develop an understanding of the framework and structure the metrics for training within that framework. All new training systems and C4I architectures should accommodate the ability to incorporate training. Training should become a transparent facet through the enterprise services piece of the global grid.

Dr. David Chu delivered a challenge to the MORS community at the June 2003 MORS Symposium to use their Military Operations Research background to conduct assessments and make recommendations to improve T2, specifically he asked that MORS:

- Examine scientific and technological innovations to include the incorporation of new net-centric tools, processes, and methods in current and future operations.
- Assess new analytical methods and measures to improve joint training effectiveness and joint readiness, enhance adaptability/intuitively joint response, employ new joint operational concepts, and prepare for cross-cultural and organization interoperability.

This workshop was the initial response to that challenge.

OVERVIEW

The workshop was conducted in three phases: (1) a one-day mini-symposium to present the current state of the need for the JAEC; (2) a two-day workshop with four tracks, representing different aspects of analysis and assessment, attended by an invitation only sample of military, government, industry, and academia; and then finally (3) a one-day synthesis meeting of the track leads and workshop sponsor to identify and organize common themes, second and higher order issues, and to consolidate recommendations.

The mini-symposium was kicked off with a presentation by Dr. David Chu, Under Secretary of Defense for Personnel and Readiness, who focused on the transformation of the total force and the requirements for training to get inside the natural cycles of other transformation efforts in order to become an enabler for agile change. Following Dr. Chu were:

Mr. Ken Krieg	Director, Program Analysis and Evaluation
Mr. Walt Hollis, FS	Deputy Under Secretary of the Army (Operations Research)
Dr. Paul Mayberry	Deputy Under Secretary of Defense (Readiness)
Mr. Dan Crowley	President, Lockheed Martin Simulation, Training and Support
MajGen Jack Catton	J7, Joint Staff
CAPT Al Kolpacke	JFCOM

Some major themes and challenges for transformed training emerged as we listened to the candid presentations from the speakers:

- It is not merely about transforming how we train; we must also transform the manner in which training is assessed. We must transition to a system that measures outputs and, eventually, outcomes. In addition to measuring collective training results, we must continue to measure individual training readiness. Individual and collective training must be synchronized in order to ensure that training efforts are continually adding to the capabilities of the total force.
- To be able to track the progress of training and education, the Department of Defense Readiness Reporting System (DRRS) must be responsive and adaptable to Service inputs. Key to maintaining an accurate picture of readiness in DRRS is organizing collective and individual Joint and Service training information into a common view to allow existing training efforts to run efficiently in their native environments, yet align with the top level goals for readiness.
- The role of simulations must become more well-defined in qualitative and quantitative terms. While simulations (large-scale or focused) have great potential to provide easily accessible and distributable training stimuli, they also consume many resources to do so. Assessment must be able to characterize and measure the contribution of simulations with respect to the training requirements and current state of readiness in order to be effective. We must be able to distinguish between when more is better and more is more with respect to the use of simulations.
- One of the priorities for the Department is setting up the Standing Joint Force Headquarters (SJFHQ) — how to organize and how to train. Training must not only be aligned to the requirements for the "core elements" of the SJFHQ, but also address the individual needs of the individual augmentees with respect to the Joint Training Continuum that drives the growth of Joint operations proficiency a knowledge as a corporate knowledge within the DoD.

To conclude the mini-symposium, Mr. Dan Gardner, Director, Readiness and Training Policy Programs in OSD (P&R) led a panel consisting Service representatives: BG Bill Weber (Army), Mr. Jeff Bradshaw (Air Force), Dr. Mike Bailey (USMC), and CAPT Mike Mara (Navy). The Services discussions provided a basis for the working groups to consider the status of Training Transformation and how it is being implemented.

The working groups were organized along the functional boundaries set out by Dr. Chu:

Working Group 1	New Organizational Concepts
Working Group 2	New Analytical Methods and Measures
Working Group 3	Scientific and Technological Innovations
Working Group 4	Implications of Capabilities-based Planning and Analysis to T2

Working Group 1, New Operational Concepts for Assessment, was Co-Chaired by Dr. Beth Biddle and Mr. Don Bouchoux. The investigation, supporting briefings, and subsequent discussions covered four broad topic areas:

1) Organization for Joint Training/Training Transformation, Role of Joint Tasks as Providing a Common Language, Evaluation of Training Events.
2) Sharing of Training and Test Range Resources, Funding Alignments.
3) Reserve Component Mobilization Policies and Training Strategies.
4) Continuous Adaptive Learning. Working Group 1 developed recommended plans of action for each of these concerns.

Working Group 2, New Analytical Methods and Measures, was Co-Chaired by LTC Mike Kwinn and Mr. Dean Free. Working Group 2 implemented two concepts in their group dynamics, which led them to a well-considered and useful solution. The group used *Value Focused Thinking* (Keeney, 1992) to identify the functions to be measured. This leads to a multi-dimensional approach to assessment. Affinity Diagramming allowed the working group to develop the top level of the hierarchy. The working group then split into sub-groups to address each of the top level functions, breaking them down further to identify objectives and, finally, metrics. Working Group 2 focused on the development of a methodology for analyzing training development to support transformation. They then used this methodology to identify the metrics they recommended using for this analysis. The hierarchy and the metrics will allow analysts to determine the relative value of the initiative.

Working Group 3, Scientific and Technological Innovations, was Co-Chaired by Dr. Amy Henninger and MAJ Doug Matty. Working Group 3 heard briefings from subject matter experts to examine the re-engineering of organizational policies and procedures to be key in improving efficiency (in terms of cost and time) of training and education. Working Group 3 determined that the ability to focus and prioritize requirements, the ability to reuse components and the ability to evoke creative contracting procedures to be the biggest drivers in accelerating the requirement to action cycle time. The biggest ROI to enable rapid scenario generation and consistent synthetic battlefield representations will come from the ability to define common data models and repositories and the ability to energize NIMA. Once accomplished the development of tools to automate or aid in the development of scenarios is more readily achievable.

Working Group 4, Implications of Capabilities Based Planning and Analysis to T2, was Co-Chaired by LT Alex Hoover and Mr. Bob Gregg. Working Group 4's specific near term recommendation is to develop and then publish/maintain a "Joint Capabilities List" that complements the various joint and service task lists. Working Group 4 directly addressed more specific issues that resulted in thoughtful recommendations including how to use the Universal Task List to support training.

The Synthesis Group was chaired by Roy Reiss and consisted of the chairs of the individual working groups and the workshop sponsors. The key trends identified across the working groups were:
- **Blurring of traditional training roles and responsibilities**
  - To operate as a total force, the Service, COCOM, and Joint forces need to leverage the commonalities among their processes and focus their specific training efforts on dealing with their unique requirements. These

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requirements now span all levels of warfare and extend beyond the training roles defined in Title X.

- **No common definitions and understanding of new terms**
  - o We are hobbled by lack of commonly accepted lexicon and standards; we need a common up to date glossary of terms to enable synchronizing Service and Joint training information.
- **Service vs. joint training may be an artificial distinction**
  - o OSD must focus on warfighting capabilities vice historic service responsibilities. These priorities serve several masters; they must to support COCOM mission requirements and training gaps, the Joint Learning Continuum, and the Service requirements.
- **Metrics to evaluate the relevant effectiveness of the learning**
  - o Feedback must capture proficiencies and improvements to the learning environment. These assessments should evolve from Universal Joint Task List to a Capabilities Based Planning based system. This is especially important due to the current lack of a mapping from capabilities to measurable training outputs.
- **Making training more relevant and timely**
  - o Collaboration in training between the Joint Force and the Services must make exercises/events more meaningful with respect to the operational context.
- **Synchronized training efforts should be composeable**
  - o Use small events (focused on specific capabilities) as building blocks to create larger events as an integrating of the small events/exercises as opposed to a standalone activity. This will enable changing the overall training model to: Train - Mobilize - Tailor - Deploy.

FINDINGS

Dr. Mayberry concluded that the workshop had accomplished some tremendous progress on the challenges that Dr. Chu laid out. He appreciated the full and robust range of issues and recommendations of the workshop. He appreciated that the notion of blurring the line between training and operations emerged in the discussions. The characteristics of the current force demonstrate that it is adaptable and changeable. We need to ensure the training environment is also active, changeable, and tailorable. We may be focused on making it adaptive, but perhaps not as focused on making it tailorable. How do we recognize that not everyone needs to have the same level and intensity of training?

Dr. Mayberry also liked the ideas proposed on making progressions of exercises more robust in each successive iteration. This allows for continuation of training and emphasis on exercise problems over longer time periods. Although we can develop metrics and evaluate outputs, we shouldn't under-rate the importance of the commander's sense of outcomes. They have lived the operational and can sense the training of the unit. Another aspect of our progressive training is to ensure we continue to train leaders to make those kinds of professional judgments consistently and reliably. What we need is the intermediate evaluation metrics that allow us to measure the training results.

Based on the trends in the working groups, the Synthesis Group took the specific recommendations from individual groups and organized them into a set of actionable recommendations. The following recommendations are offered for the way ahead:

- Develop a defined set of training roles and responsibilities that go beyond the minimum requirements set forth in Title X, that address the core competencies for the Joint Staff and the unique requirements of the individual Combatant Commanders.
- Develop a common glossary and standards for the reporting and analysis of training information to synchronize the collection and assessment of training efforts from the Service level up.
- Focus on the current evolving warfighting capabilities vice historic Service responsibilities.
- Develop a mechanism to characterize and track the variation in the context of the deployed capabilities and the core capabilities of the SJFHQ.
- Develop an integrated overall sustained training plan that links events (large and small) by comparing and contrasting the content and context of the training to move toward a system of centralized brokering of requirement to capabilities.
- Implement policies, procedures, and metrics to measure change management.

These recommendations can be implemented by each the three Training Transformation engines, JAEC, JNTC, and JKDDC, within their respective assessment capabilities. They set the path for both addressing the TC AoA gaps and developing the T2 engines into self-sustaining and improving capabilities within the DoD training environment.

FOLLOW-UP TO THE WORKSHOP

Many of the recommendations from the working groups have been integrated into the JAEC operations. The metric development process developed in Working Group 2 was instrumental in developing the metric structure for the 2005 Assessment of Training Transformation. The adaptive planning work identified in Working Group 1 has been considered in JKDDC assessment development. Other actions continue to have an impact on the analysis in Training Transformation.

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Acronyms

C4I	Command, Control, Communications, Computers and Intelligence
COCOM	Combatant Command
DoD	Department of Defense
DRRS	Department of Defense Readiness Reporting System
JAEC	Joint Assessment and Enabling Capability
JFCOM	US Joint Forces Command
JKDDC	Joint Knowledge Development and Distribution Capability
JNTC	Joint National Training Capability
MORS	Military Operations Research Society
NIMA	National Geospatial-Intelligence Agency
OSD	Office of the Secretary of Defense
OSD (P&R)	Office of the Secretary of Defense (Personnel and Readiness)
ROI	Return on Investment
SJFHQ	Standing Joint Force Headquarters
T2	Training Transformation
TC AoA	Training Capabilities Analysis of Alternatives
USD (AT&L)	Under Secretary of Defense (Acquisition, Technology and Logistics)
USMC	United States Marine Corps

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Terms of Reference

1. Background

Training Transformation

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To achieve training system transparency in joint force operations, the Deputy Secretary of Defense established the following training transformation objectives to better enable joint operations:
- Strengthen joint operations by better preparing forces for new warfighting concepts
- Continuously improve joint force readiness by aligning joint education and training capabilities and resources with combatant command needs
- Develop individuals and organizations that intuitively think jointly
- Develop individuals and organizations that improvise and adapt to emerging crises
- Achieve unity of effort from a diversity of means

On June 10, 2003, The Deputy Secretary of Defense approved the DoD Training Transformation Implementation Plan in order to enable T2. This plan designates three program capabilities to carry out the T2 Initiative:

1) *Joint National Training Capability (JNTC).* The JNTC mission is to prepare units and staffs collectively to improvise, adapt, and achieve unity of effort - with appropriate joint context - allowing global training and mission rehearsal to support operational needs.
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To facilitate desired training system throughput and capability delivery, leading ultimately to training system transparency to force operations, JAEC is charged with measuring T2 progress through assessment, analysis, and enabling effectiveness and efficiency. To properly conduct assessments, we must be able to determine measures of effectiveness, measures of performance, and measures of merit. In order to enable effectiveness, we must thoroughly understand and enable training objectives, training audiences, and training tools. JAEC assessment will include analysis for planning operations and planning exercises with robust after action review processes and a broad set of tools. In order to enable training planning, we must develop an understanding of the framework and structure the metrics for training within that framework. All new training systems and C4I architectures should accommodate the ability to incorporate training. Training should become a transparent facet through the enterprise services piece of the global grid.

In addition to the capabilities of the T2 initiative, a major effort was undertaken by DoD in the summer of 2003 to conduct a "Training Capabilities Analysis of Alternatives" (AoA). The Under Secretary of Defense for Acquisition, Technology and Logistics (USD (AT&L)) directed the AoA to examine cost-effective methods for meeting joint and Service training requirements. The AoA Senior Advisory Group (SSG) is co-chaired by the USD (P&R) and the Commander, US Joint Forces Command. The AoA report will be completed in July 2004 and will provide background for the MORS T2 special meeting. The emerging results of the AoA effort have provided key insights into the existing gaps in training based on both current and future operational needs and will provide the corresponding training system enhancements with improved capabilities to fill those needs. The AoA provides a robust analytic underpinning for the future direction of T2 and specifies programs to meet the expanded training requirements for future military operations.

More information and background on Training Transformation is available at www.t2net.org .

2. Goals and Objectives

As a beginning dialog in developing more appropriate tools and metrics associated with this emerging environment, Dr. David Chu delivered a challenge to the MORS community at the June 2003 Annual Symposium to use their Military Operations Research background to conduct assessments and make recommendations to improve T2, specifically he asked that MORS:

- Examine scientific and technological innovations to include the incorporation of new net-centric tools, processes, and methods in current and future operations.

- Assess new analytical methods and measures to improve joint training effectiveness and joint readiness, enhance adaptability / intuitively joint response, employ new joint operational concepts, and prepare for cross-cultural and organization interoperability.

This is an exciting time for Military Operations Research Analysts as we are preparing to meet the challenges of Force Transformation. We, as a community, have been invited to conduct analysis of the Performance Assessment related capabilities of the Training Transformation initiative to help insure success.

In the course of this special meeting we will focus on making assessments across four areas and align these topics with the four working groups:
- New organizational concepts
- New analytical methods and measures
- Scientific and technological innovations
- Implications of capabilities based planning and analysis

The working groups will then apply their assessments to a set of draft recommendations to add depth and breadth to our final recommendations.

3. Approach

A Mini-Symposium and Workshop will be held 28-30 September 2004 at Science Applications International Corporation in McLean, VA. The one-day mini-symposium will focus on providing state of the initiative discussions led by senior leadership in the Department. The two-day workshop will utilize the information gleaned from the mini-symposium and other invited speakers combined with the talents and experience of the MORS community to make recommendations on the topics discussed in the Goals and Objectives. A Senior Advisory Group will participate in roundtable discussions prior to the meeting to draft a set of responses to be used as a framework in producing the final recommendations.

1ˢᵗ Day Mini-Symposium
The meeting will commence with a one-day mini-symposium to include discussions from the MORS Proponent, the OSD Office of Personnel and Readiness, and discussions on Implementation from the Military Services and Agencies.

2ⁿᵈ and 3ʳᵈ Day Workshop
The mini-symposium will be followed by a two-day workshop where participants will listen to invited speakers and meet in working groups to further examine specific topics, including the overarching issues of the workshop.

Speakers will be invited to provide insights on the following topics:
- Integrated training and education systems
- Innovative approaches for measuring modern warfare training and education needs
- Ways to improve requirement-to-action cycle time
- Optimizing warfighter intellectual capability throughput
- How to minimize training system operating costs
- What indicators can be used to predict new capabilities
- On-line gaming for both individual and collective training
- Rapid scenario generation developments and direction
- Common synthetic battlefield representation developments and direction

- Maximizing life-cycle cost effectiveness of training systems
- Exploring alternative training acquisition strategies
- Examining measures of merit/measures of performance for training
- Exploring/optimizing training alternatives
- Wargaming innovations for training

Working Groups.

Working Group 1	New Organizational Concepts
Working Group 2	New Analytical Methods and Measures
Working Group 3	Scientific and Technological Innovations
Working Group 4	Implications of Capabilities-based Planning and Analysis to T2

Synthesis Group. The Synthesis Group will provide collective top level recommendations based on the discussions of the working groups and keynote speakers.

Roundtable Discussion Group. This group will meet twice prior to the September workshop and participate in the synthesis group at the workshop.

4. Agenda (tentative)

Tuesday, 28 September 2004

0700	Registration and Continental Breakfast
0800	MORS Welcome
0830	Overview onT2 Direction—OSD Perspective
0915	T2 Direction—An Industry Perspective
1000	Break
1030	Sponsor Welcome and Keynote Introduction
1100	Keynote Presentation
1200	Lunch
1300	T2 Implications to Joint Staff
1345	T2 Implications to PAE
1430	Break
1500	Service comments and panel discussion
1700	Mixer

Wednesday, 29 September 2004

0715	Continental Breakfast
0800	User/Customer Panel Discussion
0900	Workshop Overview
0915	Introduce Roundtable Members
0930	Roundtable discussion briefing
1000	Break
1015	Introduce agenda and first speaker

1020	Speaker 1
1040	Speaker 2
1100	Speaker 3
1120	Speaker 4
1140	Speaker 5
1200	Lunch in Working Group Rooms
1300	Speaker 6
1320	Speaker 7
1340	Speaker 8
1400	Working Group Discussion, First Revision of Draft Product
1700	Working Group Chair, Co-Chair and Synthesis Group Hot Wash

Thursday, 30 September 2004

0715	Continental Breakfast
0800	Presentation by Synthesis Group of Revised Recommendations
0830	Speaker 9
0850	Speaker 10
0910	Speaker 11
0930	Break
1000	Working Group Discussion, Second Revision of Draft Product
1200	Lunch in Working Group Rooms
	Prepare Outbriefs
1400	Break
1430	Outbriefs from Working Groups with discussion
1600	Outbrief from Synthesis Group
1630	Closing Remarks from Dr Chu
1700	Workshop Adjourn

Friday, 1 October
| 0800 | Working Group Chairs and Synthesis Chair prepare and submit annotated briefings. |

5. Attendees

Attendees will be by invitation only. Attendees will include invited experts from OSD, all Services, the Joint Staff, University Affiliated Research Centers, Federally Funded Research and Development Centers, Operational Commanders, DoD contractors and others. Workshop chairs will control membership of their sessions in conjunction with the organizing committee. Workshop attendance will be limited to 150 people.

6. Products

Several Products will be generated from the workshop:
- The initial product will be a briefing on Thursday, September 30th to invited executives from OSD, the Joint Staff, and the Service Staffs.
- An Executive Summary in the form of a text document and a scripted briefing for the MORS Sponsors addressing the workshop objectives, findings, conclusions, and recommendations will be prepared within 30 days of the conclusion of the workshop.

- A proceedings document containing summaries of all sessions and annotated copies of appropriate briefing slides and presentations.
- An article summarizing the meeting and its findings will be produced and submitted to *PHALANX* in time for the next deadline after the meeting. A presentation will be made in a Special Session at the 73rd MORSS.

7. Planning and Organizing Committee

Workshop Co-Chairs:
Fred Hartman, FS
Annie Patenaude

Synthesis Group Chair:
Roy Reiss

8. Administrative

Name: Training Transformation: Analysis and Assessment in New Operational Environments
Dates: 28-30 September 2004
Location: Science Applications International Corporation, McLean, VA
Fees:
      One-Day Mini-Symposium Only: US Federal Government $115; All Others $230
      Full 3-Day MS and Workshop: US Federal Government $225; All Others $450

Classification: Unclassified